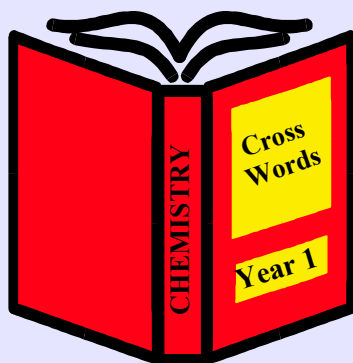


Quick Revision Crosswords

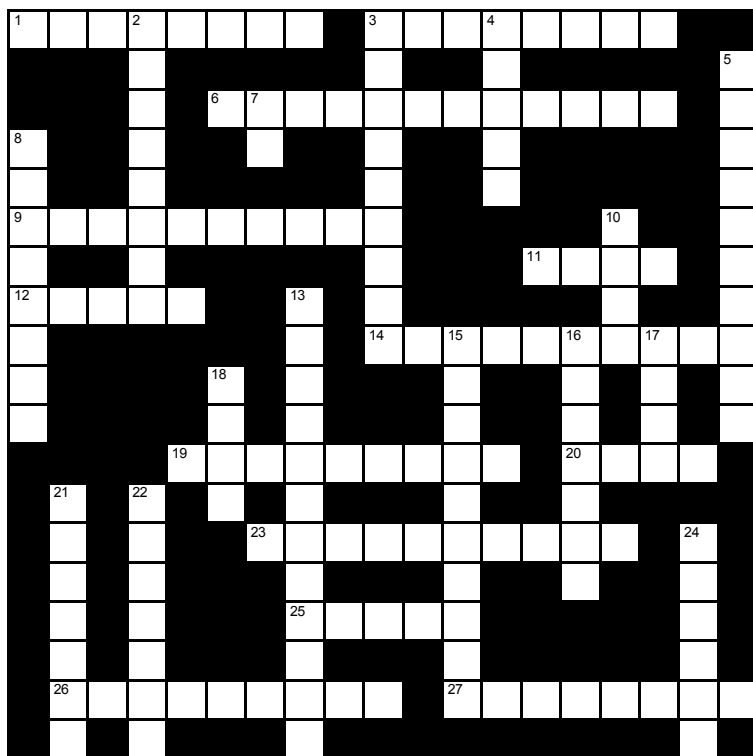
First Year GCE A level (or AS) Chemistry

Puzzles & Solutions

**Each of these crosswords draws on material
selected from the whole of AS (or First Year)
GCE A level Chemistry**



Puzzles:



Xword I

Across

- 1 Ethyl ethanoate is isomeric with this acid. (8)
- 3 Ethene is produced by cracking a distillation fraction of this substance (5,3). (8)
- 6 A free radical (8,4). (12)
- 9 Thermal decomposition of PVC gives (5,5). (10)
- 11 Secondary alcohol group. (4)
- 12 This class of compound contains an NRR group where R represents hydrogen and/or alkyl groups which can be the same or different. (5)
- 14 The heat change when ethene is hydrogenated. (10)
- 19 Teamed up with Maxwell. (9)

- 20 Some of these insects produce formic acid for defence purposes. (4)

- 23 This is its formula, CHOCHO. (10)
- 25 The number of sodium salts of phosphoric acid. (5)
- 26 The colour of nitrogen(IV) oxide (4,5). (9)
- 27 We say this is how molecules enter the ionisation chamber of a mass spectrometer (4,4). (8)

Down

- 2 The type of reaction occurring when ethene reacts with bromine. (8)
- 3 The nature of pure hydrogen peroxide. (9)

- 4 Contains two carbon-carbon double bonds. (5)

- 5 This acid is a weak acid but stronger than ethanoic acid. (10)

- 7 Which requires most energy, the breaking of the HH bond or the breaking of the HBr bond? (2)

- 8 In aqueous solution it is used to preserve biological specimens. (8)

- 10 The oxidation number of nitrogen in dinitrogen tetroxide. (4)

- 13 The type of reaction occurring when ethane reacts with bromine. (12)

- 15 Limonene is present in this skin (6,4). (10)

- 16 This compound is very pungent and smells of rotten

apples. Its molecule contains two carbon atoms, four hydrogen atoms and an oxygen atom. (7)

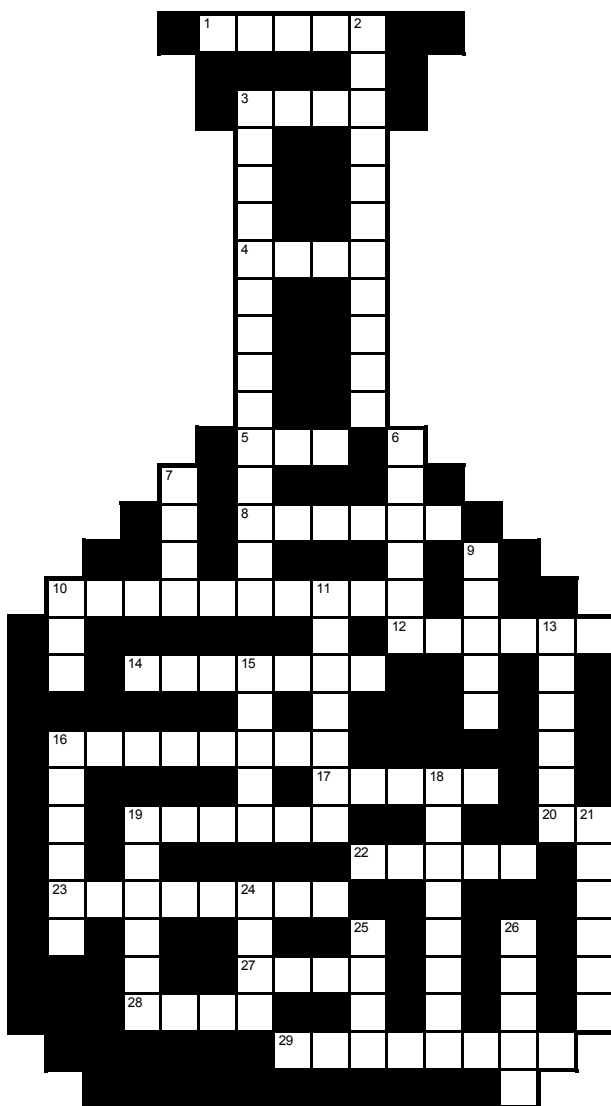
- 17 Adding sulphur trioxide to water produces this physical phenomenon. (4)

- 18 Hydrogen peroxide and hydrazine. A good or poor rocket propellant? (4)

- 21 In order for molecules to react they must? (7)

- 22 Ionising electrons do this to molecules in the mass spectrometer. (7)

- 24 We say that it is difficult to do this to carbon atoms attached to one another by a double bond. (6)



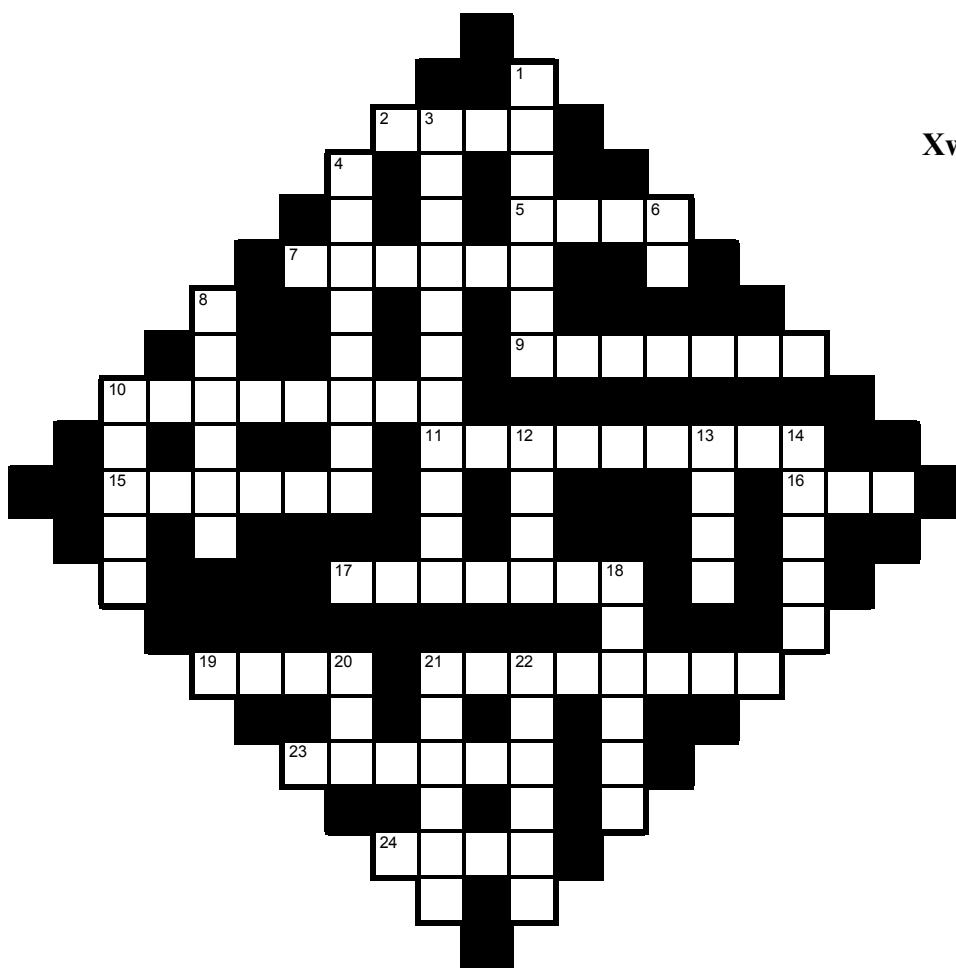
Xword II

Across

- 1 The crystalline structure of sodium chloride. (5)
- 3 A property of the group I metals. (4)
- 4 The number of moles making up 230g of ethanol. (4)
- 5 The number of moles in 88g of carbon dioxide. (3)
- 8 The colour of potassium dichromate crystals. (6)
- 10 Proceeds both forwards and backwards. (10)
- 12 The number of hydrogen atoms in 2-methylbutane. (6)
- 14 Quicksilver. (7)
- 16 The appearance of a mass spectrum resembles one of these. (8)
- 17 A safety symbol containing a skull and crossbones warns of this. (5)
- 19 The colour of the aqueous permanganate ion. (6)
- 20 This reacts violently with water. (2)
- 22 Colour of aqueous iodine. (5)
- 23 Heat change. (8)
- 27 The number of atoms of fluorine combining with one atom of silicon. (4)
- 28 Adding anhydrous copper (II) sulphate to water produces this. (4)
- 29 Converting atoms into cations. (8)
- 3 Describing the arrangement of electrons in a metal (3,2,9). (14)
- 6 That component of a mass spectrometer which deflects & focuses the particle beam. (6)
- 7 Most inorganic compounds have high melting points? (4)
- 9 Colour of aqueous iron(II) solutions. (5)
- 10 Average mass of one atom of an element compared with one twelfth of an atom of carbon-12. (3)
- 11 A device used in quantitative analysis. (7)
- 13 In the ionisation chamber of a mass spectrometer the sample exists in which physical state? (6)
- 15 Support for glassware. (5)
- 16 It burns natural gas. (6)
- 18 Boron-10 and boron-11. (8)
- 19 The common name for potassium carbonate. (6)
- 21 Used when camping. (6)
- 24 Metals occur on this side of the periodic table. (4)
- 25 In the Haber process it alters the rate of reaction but does not alter the yield. (4)
- 26 Intermolecular force in liquid ethanol (1,4). (5)

Down

- 2 The formula of ethanoic acid. (11)



Xword III

Across

- 2 Neutron charge (4)
 5 The number of neutrons in a lithium atom. (4)
 7 Gaseous state. (6)
 9 Cinnabar is its main ore. (7)
 10 A First World War weapon. (8)
 11 Boiling a liquid in a flask fitted with a vertical water condenser. (9)
 15 C_4H_{10} (6)
 16 A way of comparing atomic masses. (3)

17 Unscramble, 'sueculn'. (7)

19 Adding solid sodium hydroxide to water produces this. (4)

21 $[Kr], 5s^1$. (8)

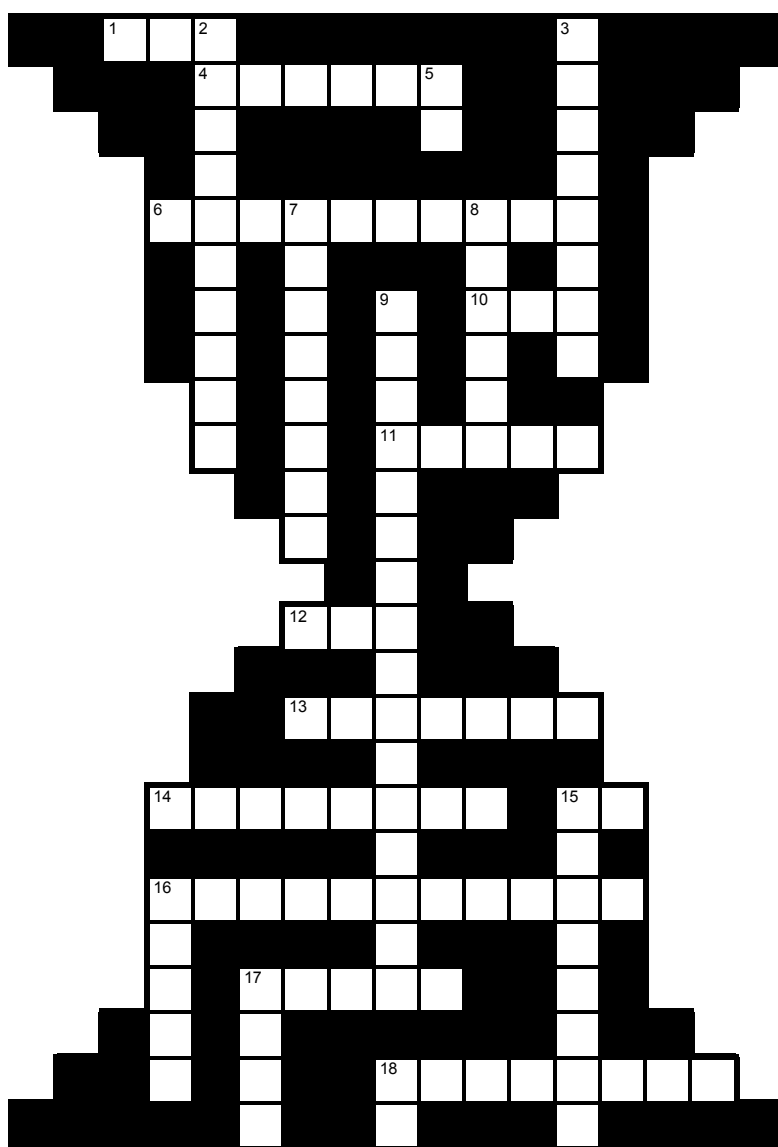
23 The physical state of sodium chloride when it will conduct electricity. (6)

24 Most organic compounds are low melting? (4)

Down

- 1 Tunsten (7)
 3 The energy change when an atom is ionised. (11)
 4 An allotrope of carbon. (8)
 6 The symbol for the element whose name derives from the Latin for red. (2)
 8 Solid dissolved in liquid. (6)
 10 The crystalline structure of lithium. (5)

- 12 The number of protons in the nucleus of a boron atom. (4)
 13 A constituent of haemoglobin. (4)
 14 Copper flame test colour. (5)
 18 Manufactured from common salt. (6)
 20 The number of electrons in a lithium ion. (3)
 21 Response. (6)
 22 Named after a German chemist who studied the emission spectra of elements. (6)



Xword IV

Across

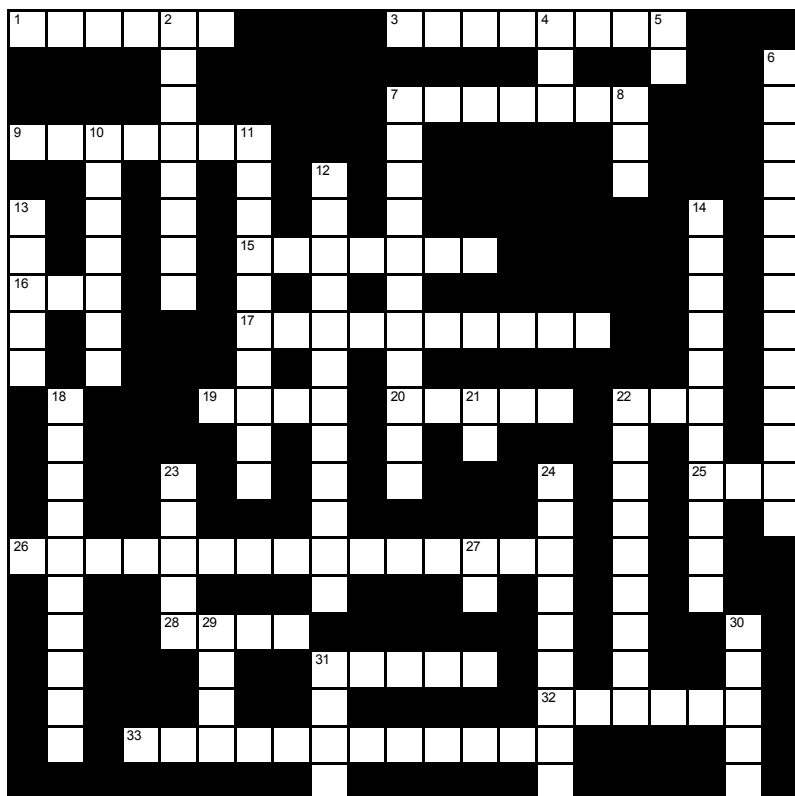
- 1 Chlorine is used in the manufacture of this plastic. (3)
- 4 When the dioxides of potassium and carbon react they produce potassium carbonate and this gas. (6)
- 6 Potassium dioxide is an example of one of these. (10)
- 10 A white powder used as an insecticide. (3)
- 11 Very concentrated sulphuric acid. (5)
- 12 The number of electrons in a beryllium ion. (3)

- 13 A disadvantage of butane as a motor fuel. (7)
- 14 The number of moles of oxygen required to completely combust two moles of butane. (8)
- 15 The streets of London are not paved with this. (2)
- 16 The common name for NaOH (7,4). (11)
- 17 +420 kJ per mol is an ionisation energy of potassium. Is it the first or the second? (5)

- 18 Reduction of but-1-ene using a nickel catalyst requires this reactant. (8)

Down

- 2 The burning of ethanol in excess oxygen is one example. (10)
- 3 The standard enthalpy of formation refers to a reaction between --- in their normal states. (8)
- 5 An oxide of nitrogen. (2)
- 7 The atomic number of argon. (8)
- 8 An element originally extracted from seaweed. (6)
- 9 Alkanes, alkenes, alcohols, aldehydes, ketones. (16)
- 15 The type of reaction occurring when HBr combines with ethene. (8)
- 16 The molecular formula of 2,2,4-trimethylpentane. (5)
- 17 The number of neutrons in a lithium atom. (4)
- 18 Etches glass. (2)



Xword V

Across

- 1 An element in Group VI. (6)
 3 The type of reaction occurring when HBr combines with ethene. (8)
 7 Iodine at 115°C. (7)
 9 We use this adjective to describe a reversible reaction at equilibrium. (7)
 15 A simple aromatic compound. (7)
 16 Dichlorodiphenyltrichloroethane. (3)
 17 Caesium dioxide is an example of one of these. (10)
 19 Glycol is an example. (4)
 20 The molecular formula of octane. (5)
 22 A polymer used to make tubing for plumbing applications. (3)

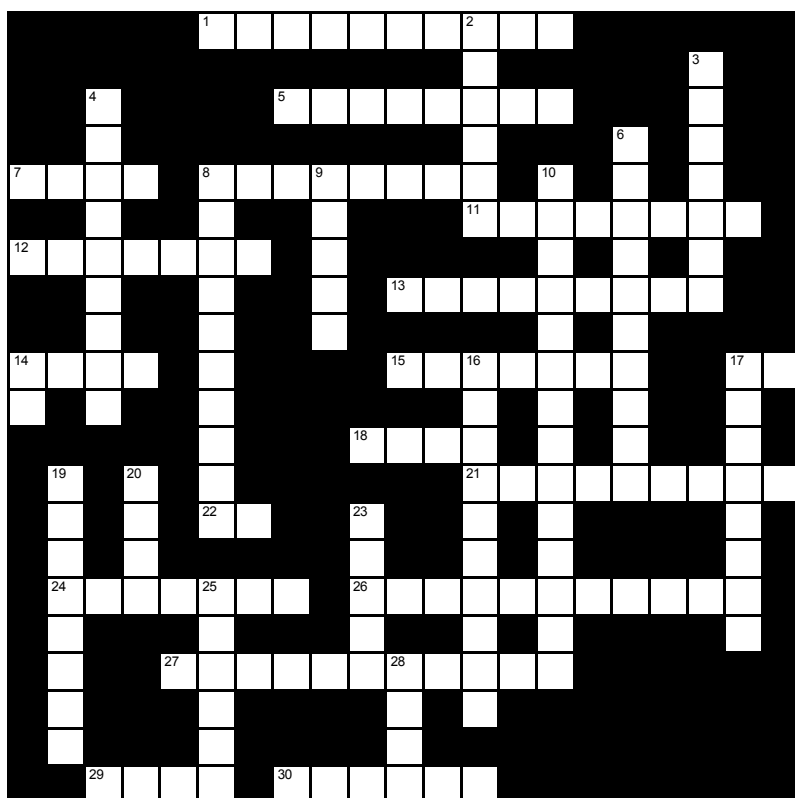
- 25 The number of electrons in a magnesium ion. (3)
 26 A compound that can be used to make up a standard solution for titrimetric analysis by accurate weighing. (7,8)
 28 A chelating agent. (4)
 31 +520 kJ per mol is an ionisation energy of lithium. Is it the 1st or the 2nd? (5)
 32 A brown, crystalline, low melting element. (6)
 33 0 K (8,4). (12)

Down

- 2 Pure substances which contain only one type of atom. (8)
 4 Beryllium is in this group in the periodic table. (3)
 5 A diatomic molecule comprising Groups V and VI elements. (2)

- 6 This applies to Bakelite. (13)
 7 A type of isomerism which is exhibited by some alkenes. (11)
 8 Standard temperature & pressure. (3)
 10 An oil fraction containing compounds which have 6 to 10 carbon atoms per molecule. (7)
 11 Chemical combination of a substance with oxygen producing heat and light. (10)
 12 This results from the unequal sharing of a bonding pair (as in the HCl molecule) (4,8). (12)
 13 A type of reaction involving the transference of electrons between the reacting species. (5)
 14 An intermediate structure containing a carbon atom carrying a single positive

- charge. (11)
 18 Surface attraction. (10)
 21 Formed when calcium fluoride is heated with concentrated sulphuric acid. (2)
 22 The iodide ion in magnesium iodide. (9)
 23 A state of matter. (5)
 24 The process in which water becomes attached to a metal cation. (9)
 27 A yellowish metal. (2)
 29 Compounds used to colour materials such as, leather, cotton, wool, silk. (4)
 30 Fuming sulphuric acid. (5)
 31 The pH of 1×10^{-4} M nitric acid. (4)



Xword VI

Across

- 1 This group of elements all have coloured molecules (5,5). (10)
- 5 The common oxidation state of the halogens (5,3). (8)
- 7 In group four. (4)
- 8 Used to lower the melting point of alumina. (8)
- 11 This describes phosphoric acid. (8)
- 12 The main commercial ore of Al. (7)
- 13 Dissolves in dilute hydrochloric acid and in sodium hydroxide solution giving hydrogen. (9)
- 14 A solution of this forms a blood red colour with aq iron (III). (4)
- 15 Very hard and can be a variety of colours. (7)
- 17 An important, but toxic, fuel. (2)
- 18 When a solution of

silver nitrate is added to brine this compound is precipitated. (4)

- 21 This is particularly strong in the case of Al and helps prevent the metal corroding (5,4). (9)
- 22 This oxide of nitrogen has 11 valency electrons. (2)
- 24 A form of sulphur stable at room temperature. (7)
- 26 The nitrogen atoms forms this structure by sharing three electrons and a pair of electrons with hydrogen. (11)
- 27 A region of the atmosphere. (11)
- 29 The smallest particle of an element. (4)
- 30 Used to make plaster of Paris. (6)

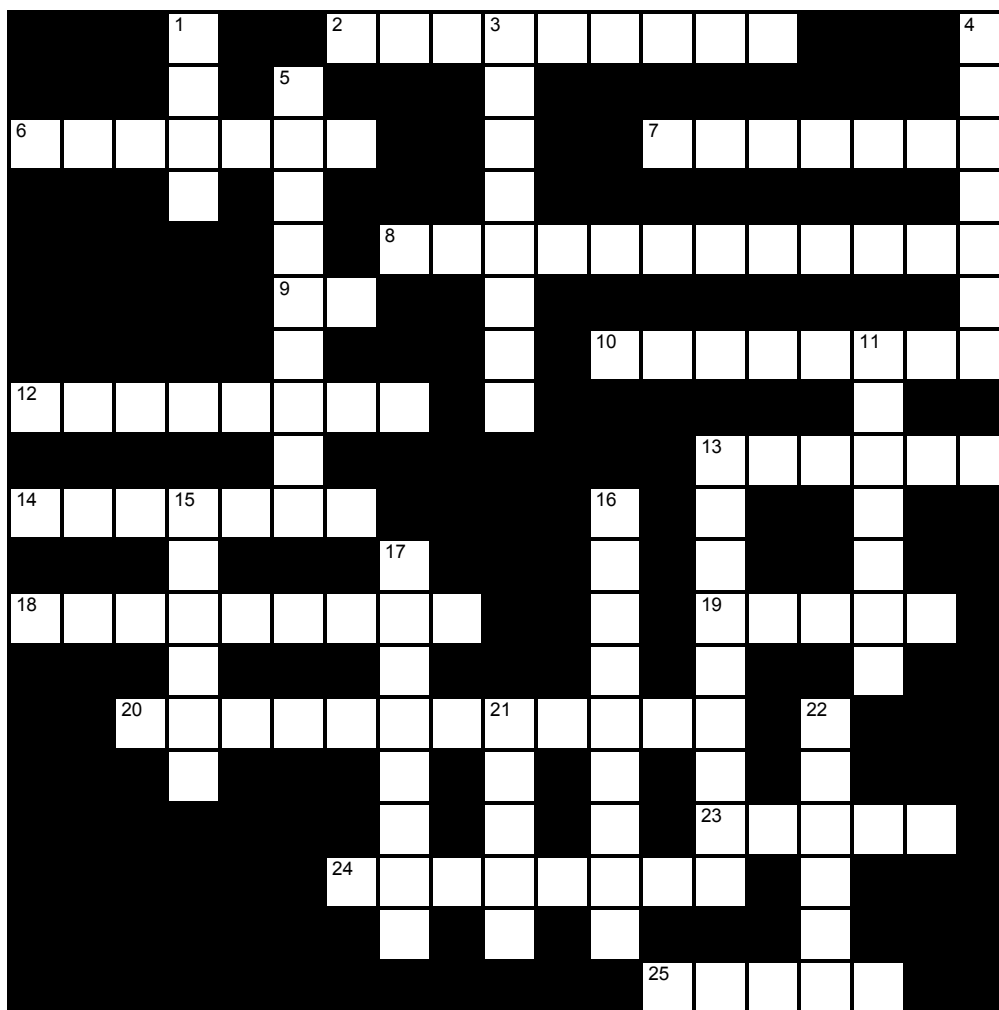
Down

- 2 A solution of iodine in the organic solvent, dichloromethane, has this colour. (6)
- 3 This element has the electronic structure (Xe)6s1. (7)
- 4 In the treatment of sewage, aluminium sulphate is used for this purpose. (9)
- 6 A yellow precipitate formed when iodide is used to test for lead (II) (4,6). (10)
- 8 Self linkage (as with carbon). (10)
- 9 This gas helps prevent harmful radiation reaching the earth's surface. (5)
- 10 Unlike carbon dioxide it does not form discrete molecules (7,7). (14)
- 14 Iodine is sparingly soluble in water but much more soluble in an aqueous solution

of this salt. (2)

- 16 Graphite and diamond. (10)
- 17 The bonding in beryllium chloride. (8)
- 19 Applying pressure, in the Haber process, has this effect on the yield of ammonia. (8)
- 20 The formula of a chloric acid. (4)
- 23 An important product derived from sand. (5)
- 25 Although in the same group, this element is more reactive than calcium. (6)
- 28 This is what happens when hydrogen is ignited. (4)

Xword VII



Across

- 2 Chlorine is one of these agents in its reaction with hydrogen. (9)
- 6 Copper ions having gained electrons. (7)
- 7 Salt maker. (7)
- 8 Oxidation number of sulphur in the tetrathionate ion (3,5,4). (12)
- 9 This oxide converts iron(III) oxide to iron and carbon dioxide. (2)
- 10 Chlorine reacts with aq thiosulphate to give hydrochloric acid and what else? (8)
- 12 Large scale production of alkenes. (8)

- 13 The flame of burning cyclohexene. (6)
- 14 Oxidation number of Group I elements in their compounds. (7)
- 18 Fluorine colour. (9)
- 19 The number of methyl groups in, 2-chloro-4-methylpentane. (5)
- 20 In the dehydration of 10g of cyclohexanol 6g of cyclohexene was produced. What was the % yield? (12)
- 23 Type of reaction of chlorine with water. (5)
- 24 If you were to dissolve hydrated copper(II) sulphate in water would the temperature increase or decrease. (8)
- 25 Oxidation number of

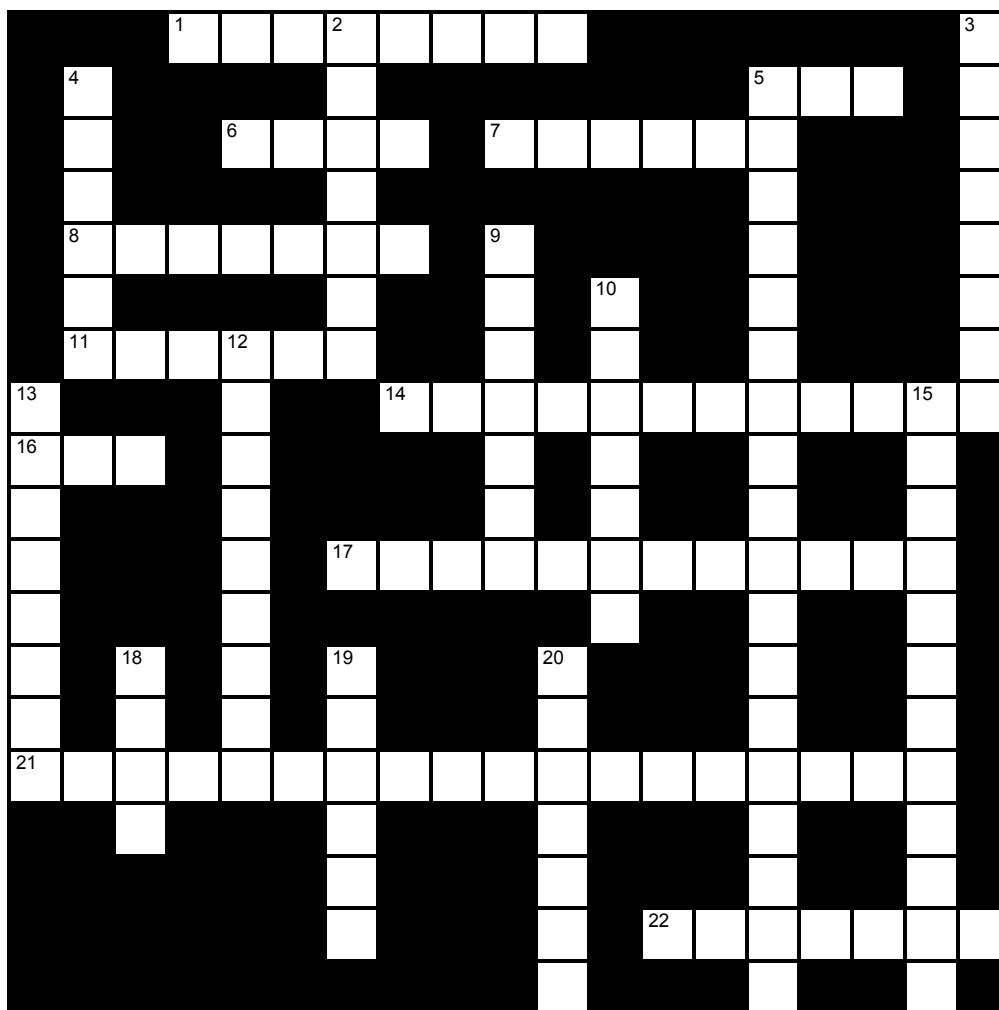
manganese in permanganate. (5)

Down

- 1 If you were to write the ionic equation for the reaction of potassium with bromine how many ions would the equation contain? (4)
- 3 A bromine molecule. (8)
- 4 Which of the following is unsaturated: ethane, ethanol, propanone, benzene, ethanoic acid. (7)
- 5 Addition of hydrogen. (9)
- 11 Saturated hydrocarbons. (7)
- 13 Sodium nitrate. (9)
- 15 Which does not

contain copper; solder, brass, duralumin, bronze? (6)

- 16 Calcium fluoride. (9)
- 17 Atoms with the same number of protons but different numbers of neutrons. (8)
- 21 In the preparation of cyclohexene from cyclohexanol why is it necessary to add calcium chloride in the final stage? (2,3). (5)
- 22 Which has the largest atom, sodium or iodine? (6)



Xword VIII

Across

- 1** The colour of the solution when excess ammonia is added to copper sulphate solution (4,4). (8)
- 5** The number of position isomers with the molecular formula $C_2H_4Cl_2$. (3)
- 6** This hydroxide is deliquescent. (4)
- 7** Formed when CuO is reacted with hydrogen. (6)
- 8** These react with chlorine in the presence of sunlight to form substitution compounds. (7)

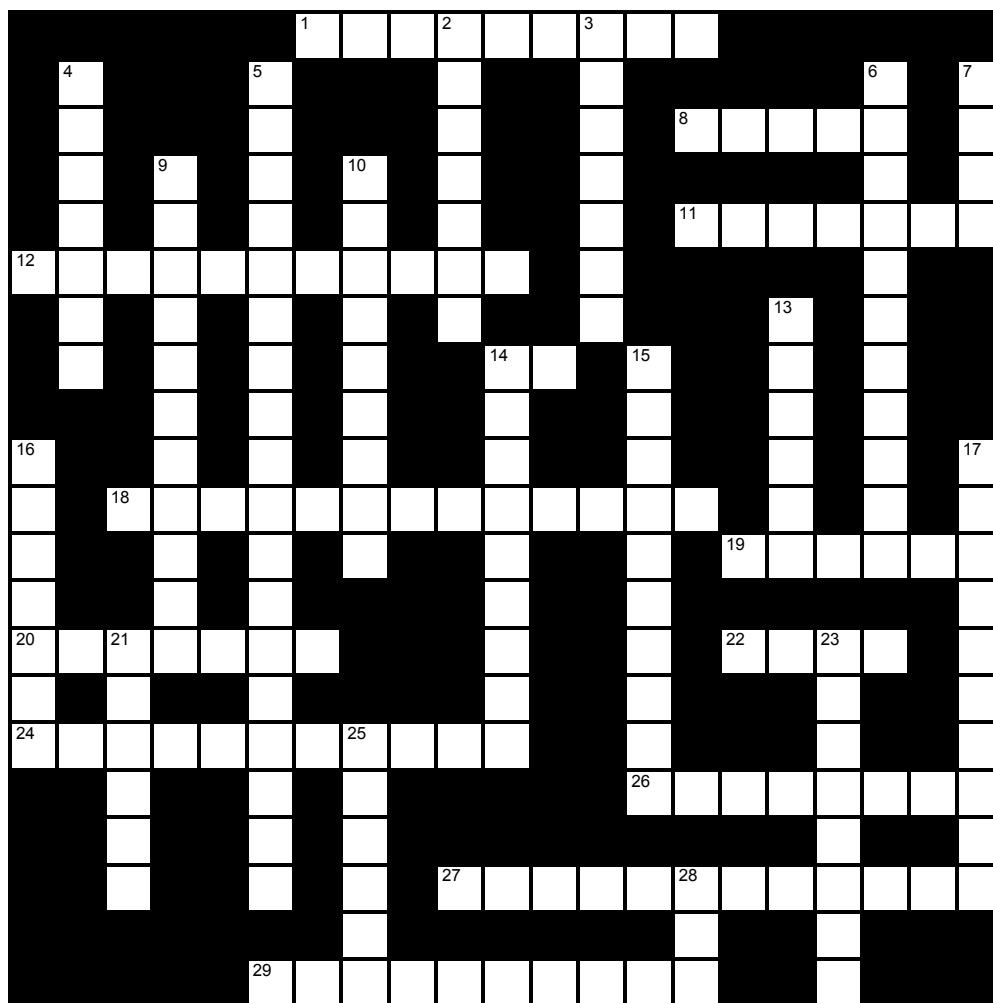
- 11** A structural isomer of 2-methylpentane. (6)
- 14** Its what lead nitrate does when heated. (12)
- 16** Smells of bad eggs (1,2,1)! (3)
- 17** A redox reaction produces $Mn(II)$ and $Fe(III)$ ions. One of the reactants is iron(II) ions name one of the other reactants. (12)
- 21** But-2-ene has two of these (11, 7). (18)
- 22** Produced when butan-1-ol is passed over heated alumina (3,1,3). (7)

Down

- 2** Like ethene, this alkene does not form geometrical isomers. (7)
- 3** All soluble in water. (8)
- 4** Disinfectant. (6)
- 5** A property of these elements is that they form coloured compounds. (18)
- 9** Which sulphate is most soluble in water, calcium or barium. (7)
- 10** Alkanes. (7)
- 12** Ethyne. (9)
- 13** This is often observed when ethene is prepared by heating ethanol with concentrated sulphuric acid. (8)

- 15** This occurs when dilute hydrochloric acid is added to sodium carbonate solution. (12)
- 18** This metal produces green and yellow ions. (4)
- 19** the sulphate of this metal finds application in medicinal X-ray work. (6)
- 20** Methylbenzene. (7)

Xword IX



Across

- 1 Charge on an aluminium ion (4, 5). (9)
 8 A type of covalent bond. (5)
 11 Twentythree grams of sodium (3,4). (7)
 12 The pi electrons in the benzene molecule. (11)
 14 A weak type of covalent bond. (2)
 18 Eg, polyethene, PVC. (13)
 19 A mixture of hydrocarbons used as a fuel. (6)
 20 Under suitable conditions their molecules join together to form long chains. (7)
 22 A type of acid, eg, ethanoic, HCN. (4)
 24 The shape of the methane molecule. (11)

- 26 Stimulant. (8)

- 27 The separation of charged particles in a liquid. (12)
 29 The relative molecular mass of calcium carbonate (3,7). (10)

Down

- 2 Dissolves in water to give sulphuric acid. (7)
 3 The colour of the precipitate when Fehlings reagent is heated with butanal. (7)
 4 A positive result using this reagent gives a silver mirror. (7)
 5 The one having the highest boiling point, tetrachloromethane, chloromethane or trichloromethane? (18)
 6 Heat measuring apparatus. (11)
 7 The number of bonding

electrons in a phosphorus atom. (4)

- 9 Product from the reaction between, ethanol, concentrated sulphuric acid and sodium bromide. (11)

- 10 The action of hot concentrated sulphuric acid on HBr. (9)

- 13 Bond between the carbon atoms in ethene. (6)

- 14 Shape of the ammonia molecule. (9)

- 15 The smell of iodoform. (10)

- 16 The process for making sulphuric acid. (7)

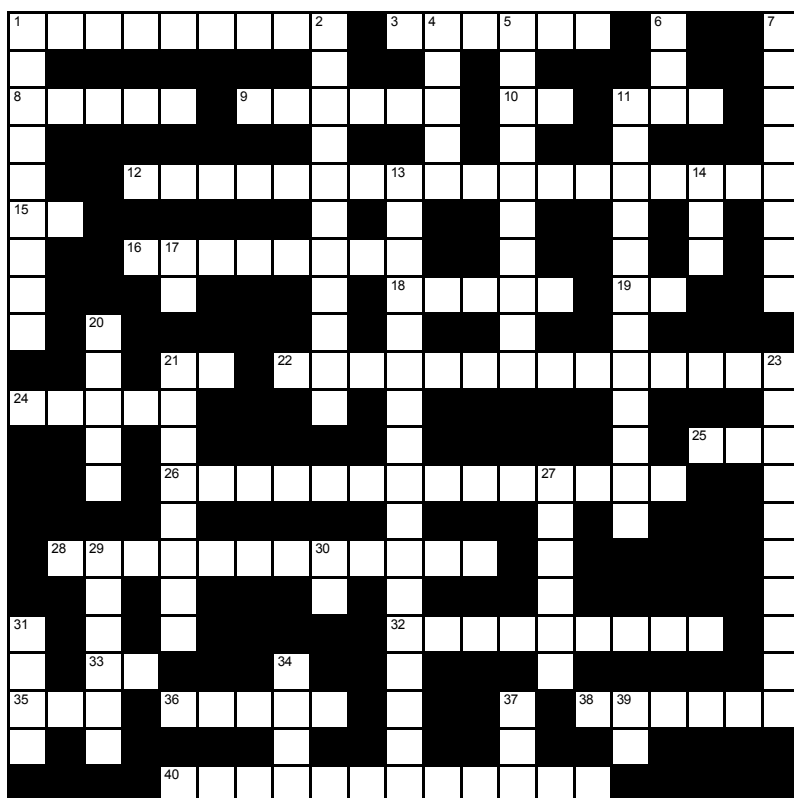
- 17 The appearance or colour of phenolphthalein in acid solution. (10)

- 21 Butanone is an example. (6)

- 23 Propanal is an example. (8)

- 25 A bond in ammonium chloride. (6)

- 28 The colour of pH paper in dilute hydrochloric acid. (3)



Xword X

Across

- 1 Used in qualitative inorganic analysis. (9)
 3 paraffin. (6)
 8 A sulphate group is an example. (5)
 9 CH_3 (6)
 10 Minus log hydrogen ion concentration. (2)
 11 Formed when concentrated sulphuric acid is heated with NaCl (3)
 12 Symbol for toxic. (18)
 15 One percent of the Earth's atmosphere. (2)
 16 Caused by calcium carbonate & calcium sulphate. (8)
 18 The overall order when, $\text{rate} = [\text{A}][\text{B}]^2$. (5)
 19 Desirability on a par with gold. (2)

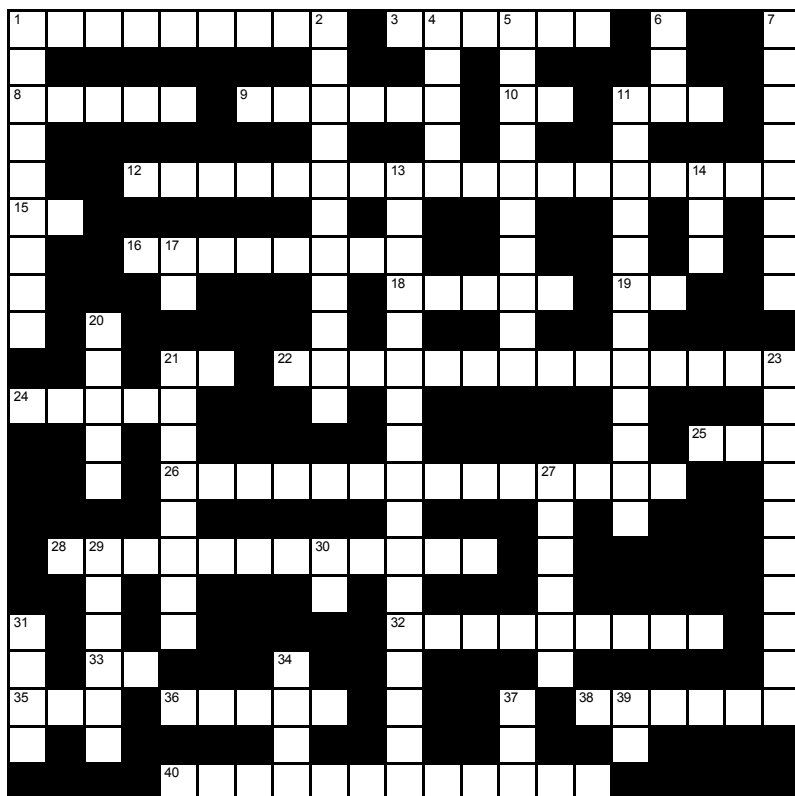
- 21 A group II element which forms some covalent compounds. (2)
 22 Used to test for sulphate ion. (14)
 24 The simple ones are pleasant smelling. (5)
 25 The number of hydrogen atoms in oxalic acid. (3)
 26 Used to make sulphuric acid on a large scale. (14)
 28 Responsible for the high boiling point of water. (12)
 32 Bromine. (9)
 33 A relatively unreactive alkali metal. (2)
 35 The aldehyde functional group. (3)
 36 The formula of a strong mineral acid. (5)
 38 A solution of iron (III) chloride. (6)

- 40 Used to support a gas jar. (12)

Down

- 1 A general property of simple organic compounds. (9)
 2 The shape of the methane molecule. (11)
 4 A colour observed when potassium is heated. (5)
 5 The nature of the oxides of aluminium and zinc. (10)
 6 Suffix for carboxylic acid. (3)
 7 Wulfram. (8)
 11 Manufacture of ammonia. (12)
 13 Shows how the energies of molecules vary. (17)
 14 Primary amine. (3)
 17 Suffix for CHO . (2)
 20 C_4H_9 group. (5)

- 21 Observed when testing for calcium. (8)
 23 Heat change when anhydrous copper sulphate is added to water. (10)
 27 An element which has a very extensive chemistry. (6)
 29 The colour of fluorine gas. (6)
 30 Natrium. (2)
 31 Formed when testing for chloride ion. (4)
 34 The carboxyl group. (4)
 37 Suffix for $\text{RRC}=\text{O}$. (3)
 39 Present in bronze. (2)

**Across**

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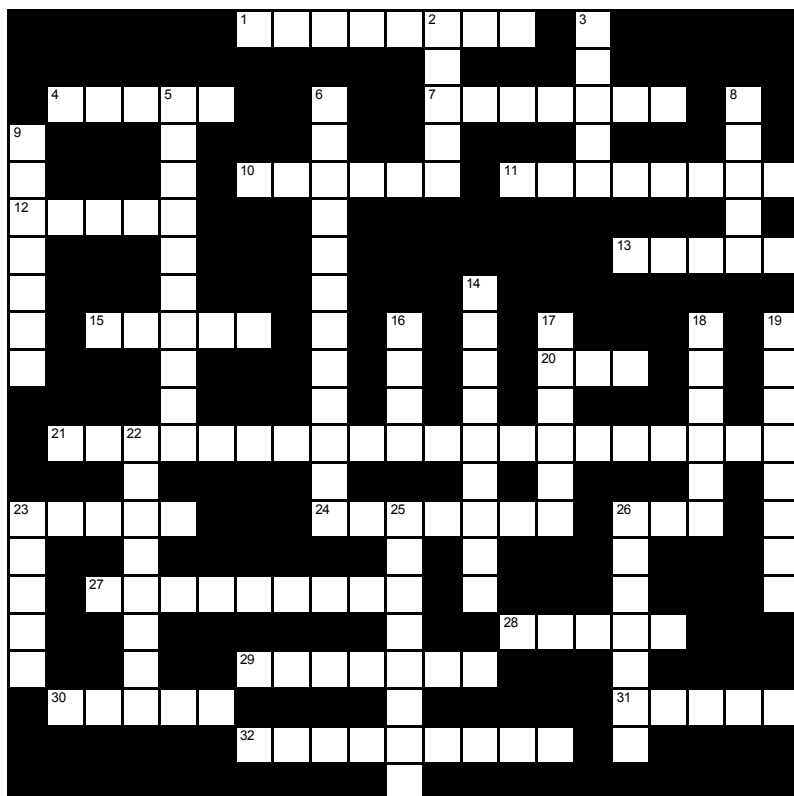
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 31 Formed when testing for chloride ion. (4)
 34 The carboxyl group. (4)
 37 Suffix for $\text{RRC}=\text{O}$. (3)
 39 Present in bronze. (2)

**Across**

- 1 Propanone. (8)
 4 The colour expected when acidified potassium dichromate is heated with ethanol. (5)
 7 Ethanoic acid. (7)
 10 Sodium bicarbonate. (6)
 11 Unbonded electrons in the ammonia molecule. (8)
 12 Methanoic acid. (5)
 13 Ferric chloride. (5)
 15 Percentage oxygen in methanol. (5)
 20 The colour of damp pH paper in sulphur dioxide gas. (3)
 21 The percentage copper in anhydrous copper sulphate. (20)
 23 Sulphuric acid. (5)

24 The brown ring test for this anion. (7)

- 26 The number of hydrogen atoms in butan-2-ol. (3)
 27 The relative molecular mass of ethanal (& carbon dioxide)! (9)
 28 Chloroform. (5)
 29 Element relative atomic mass 80. (7)
 30 Potassium hydrogensulphate. (5)
 31 Sodium nitrate. (5)
 32 In aluminium chloride the aluminium ion has this effect on the halide ions. (9)

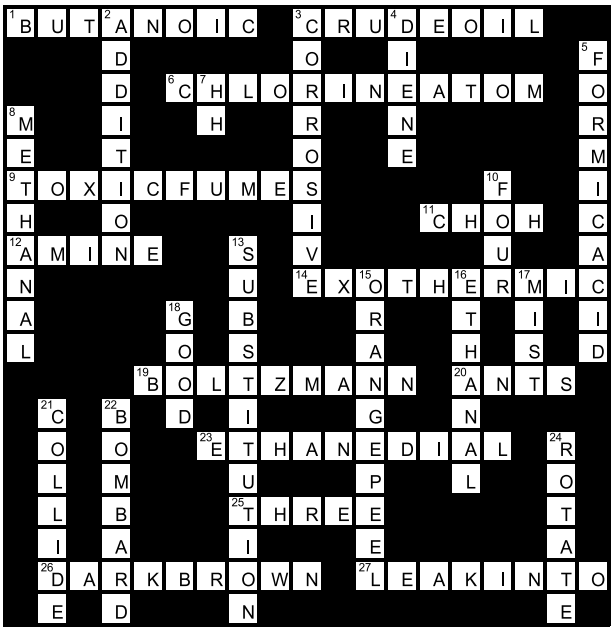
Down

- 2 Calcium carbonate. (5)
 3 The colour of gas evolved when copper is added to concentrated nitric acid. (5)
 5 The formula mass of sodium hydrogencarbonate. (10)
 6 CH_3COO^- (12)
 8 Term applied to $\text{CH}_2\text{OHCHOHCH}_2\text{OH}$. (5)
 9 Ethanamine. (7)
 14 A test for this anion involves the addition of dilute hydrochloric acid, observing effervescence and testing the evolved gas with lime water. (9)

- 16 The colour of damp litmus paper in ammonia gas. (4)
 17 The colour of the precipitate expected when a carbonyl compound is added to 2,4-DNPH reagent. (6)
 18 The gas evolved when sodium nitrate is heated strongly. (6)
 19 The relative molecular mass of ethanol. (8)
 22 Cl-35 & Cl-37. (8)
 23 Phosphoric acid. (5)
 25 The class of alcohol, 2-methylpropan-2-ol. (8)
 26 A reagent which produces a silver mirror with aldehydes. (7)

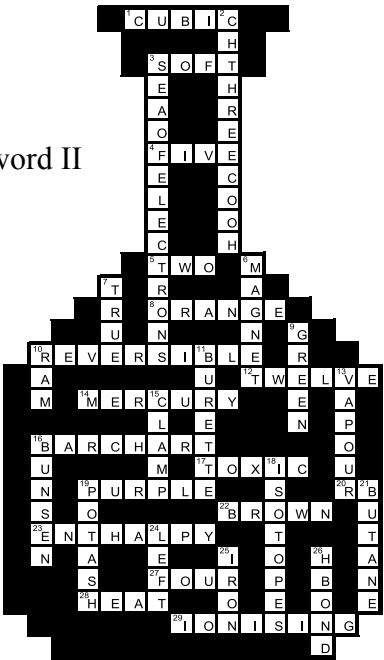
Solutions:

Xword I



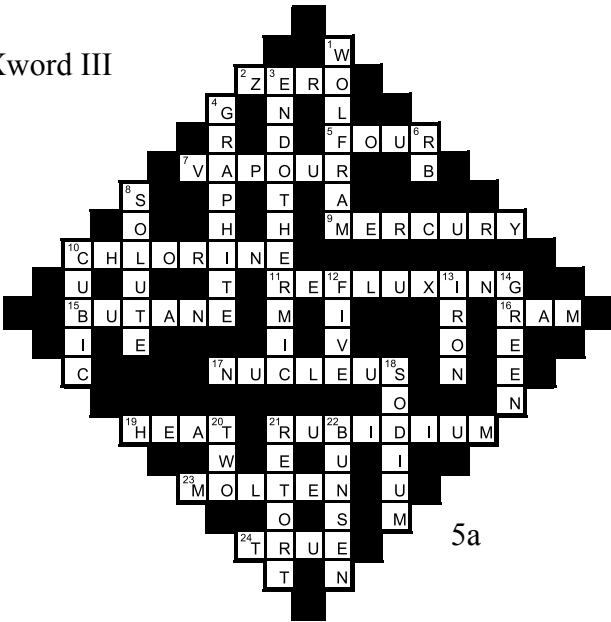
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Xword II



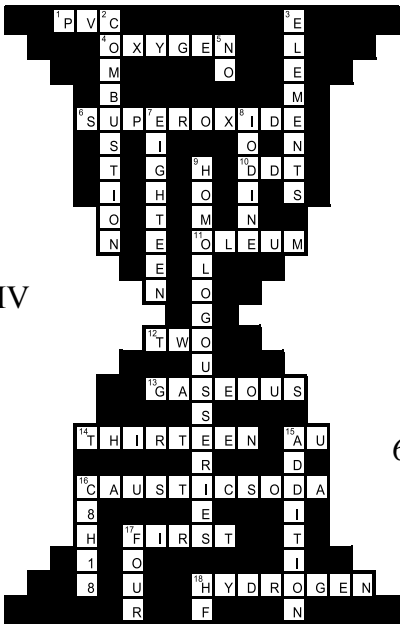
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Xword III



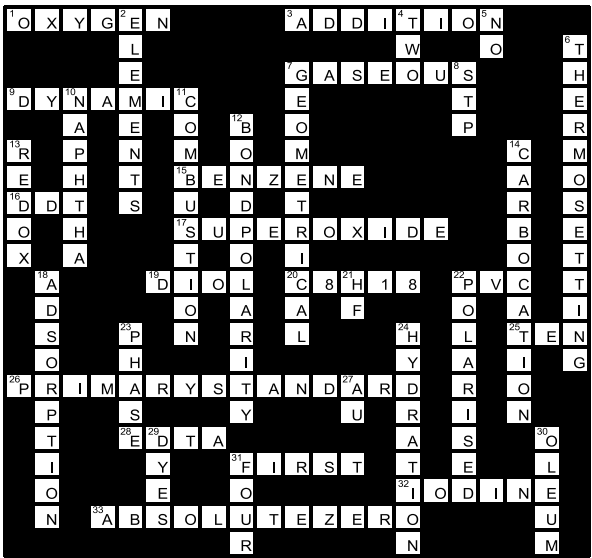
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Xword IV



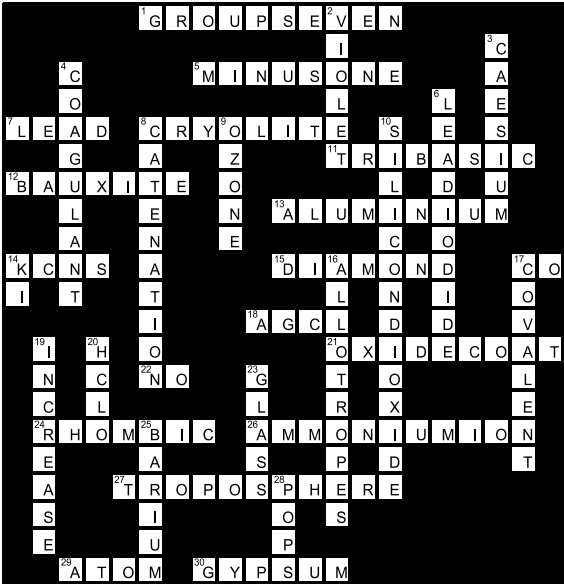
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Xword V



7

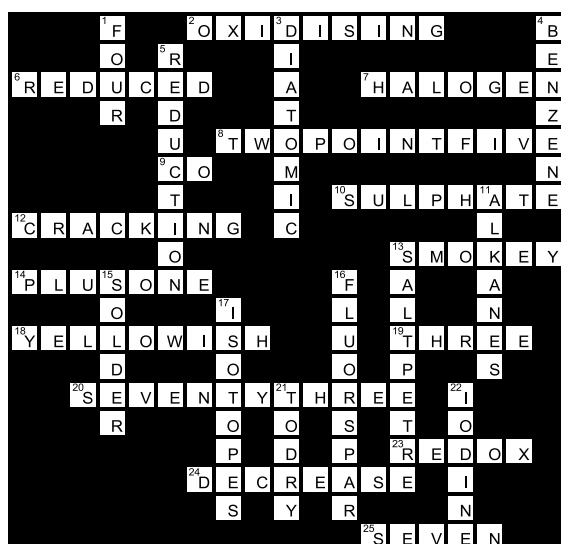
Xword VI



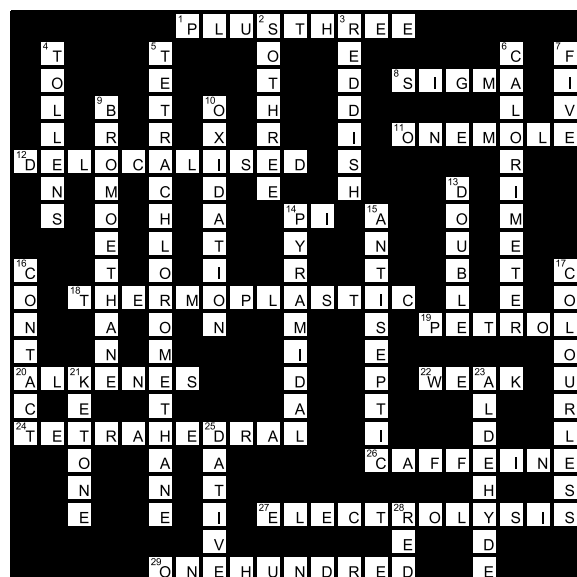
8

First Year (or AS) Chemistry Crossword Solutions (continued):

Xword VII

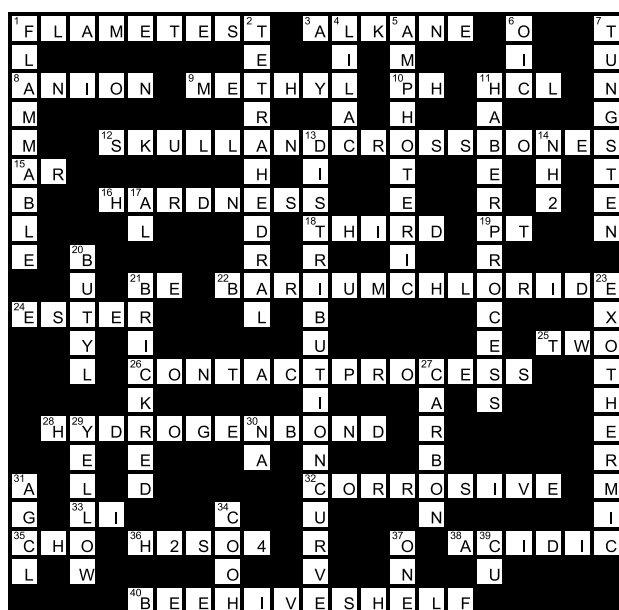


Xword IX



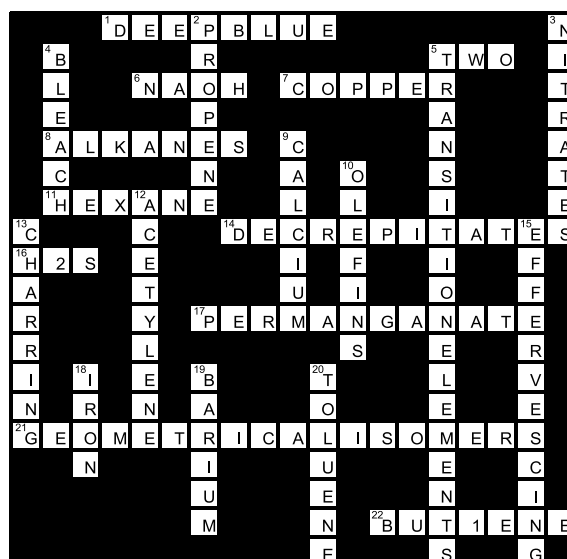
15

Xword XI

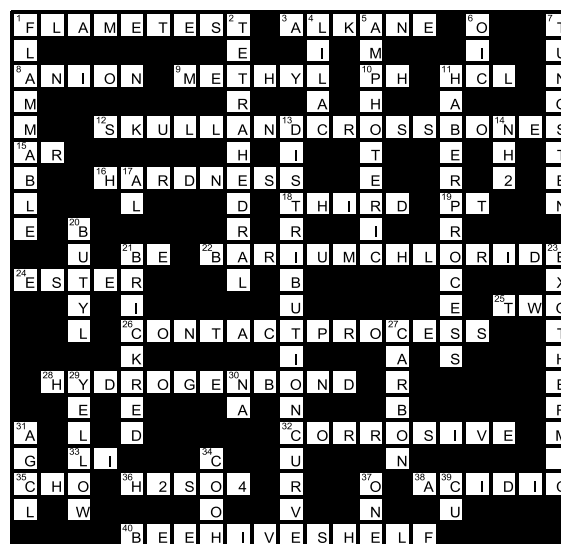


20

Xword VIII

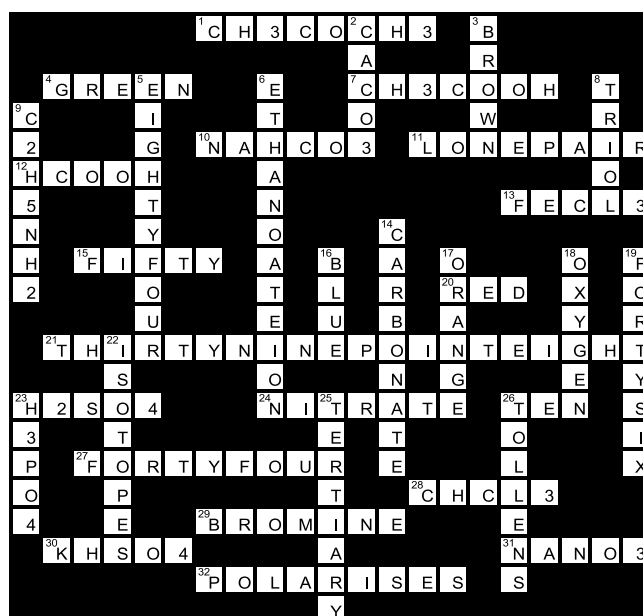


Xword X



20

Xword XII



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